# Econometrics 871

## Time Series Exercise 2

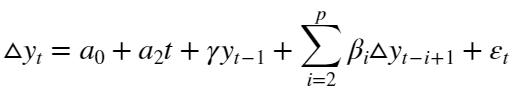
**In this exercise**: you are expected to apply the **augmented Dickey Fuller** tests to two univariate time series (South African macroeconomic data).

*You will be primarily evaluated on your application and understanding of the augmented Dickey Fuller tests. Extra effort/originality is optional for obtaining 10 out 10 (e.g., evaluating a series that does not obviously appear to have a unit root). A complete submission with minimal errors will not receive less than 6 out of 10.*

**Approach:** you may work in pairs for this assignment (only one student then submits, but clearly indicate the authors). How you present your analysis, and what statistical program you prefer to use, is up to you.

**What you need**: retrieve your own two series from, e.g., EasyData, SARB, FRED, or Codera, and follow the MATLAB tutorial script “UnitRootTestsIllustration” for the five possible tests specifications. *[Note that this illustration was generated with a simulated series. You can refer to the previous tutorial on how to input your data.]*

Follow the examples in Section 6 of Enders for applying the formal tests suggested by Dickey and Fuller where you will test the regression in the form of (4.25)

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using the adftest() function in MATLAB.

MATLAB’s implementation of the Augmented Dickey Fuller test makes this very simple, although you need to ***read the help file carefully*** (as you should do with each method you intend to use - assuming you know what a command/function does is a recipe for disaster).

The general syntax is:

[reject, p\_value, t\_stat, critical\_value, regression\_output] =

adftest(Y,'model',{'AR','ARD','TS'},'test',{'t1','F'})

**Note:** *the ADF test assumes that enough lags in the AR process explains the data generating process such that the data (and therefore the model) does not contain a nonseasonal MA polynomial. It is therefore important to use the correct number of lags in conducting a Dickey–Fuller test (see Section 7 of Enders) but take care of the trade-off: too few lags mean that the regression residuals do not behave like white-noise processes, while too many lags reduces the power of the test to reject the null of a unit root.*

*MATLAB provides a BIC test for a “general-to-specific” methodology, for example:* (...'lags',0:2)

*Read the help file on the* adftest *function carefully. There is a nice example to follow.*

**Please submit to** [**hylton@sun.ac.za**](mailto:hylton@sun.ac.za) **before the due date (which is *before* the next tutorial session).**